

AMENDMENTS TO THE CLAIMS IN CLEAN VERSION

Although only claims 57, 63 and 70 are amended above, all of the claims are shown below in clean form for use in the application and patent.

39. A 3-D graphics controller used with a television based game, comprising:
- a game, said game at least in part controlled by circuitry, said circuitry located on at least one sheet, said at least one sheet comprising:
 - a circuit board sheet connected to
 - a flexible membrane sheet;
 - a first element structured to activate four unidirectional sensors, said four unidirectional sensors at least in part connected to said at least one sheet, said four unidirectional sensors useful to control said game;
 - a second element with structure to activate
 - a first two rotary potentiometers, said first two rotary potentiometers at least in part connected to said at least one sheet, said first two rotary potentiometers useful to control said game;
 - a third element with structure to activate
 - a second two rotary potentiometers, said second two rotary potentiometers at least in part connected to said at least one sheet, said second two rotary potentiometers useful to control said game;
 - an independent first button structured to activate
 - a first button sensor, said first button depressible by a single finger of a user, said first button sensor at least in part connected to said at least one sheet, said first button sensor creates simple switched On/Off data useful to control said game;
 - an independent pivotal second button structured to activate
 - a second button sensor, said second button pivots upon depression by a single finger of the user, said second button

sensor at least in part connected to said at least one sheet, said second button sensor capable of outputting a proportional signal useful to control said game;

an independent pivotal third button structured to activate a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor at least in part connected to said at least one sheet, said third button sensor capable of outputting a proportional signal useful to control said game;

active tactile feedback vibration detectable by the user of said game.

40. A 3-D graphics controller used with a television based game according to claim 39 wherein said active tactile feedback vibration is provided by a motor and offset weight.

41. A 3-D graphics controller for controlling a television based game, comprising:

circuitry located at least in part on

at least one sheet, said at least one sheet comprising:

a circuit board sheet; said circuit board sheet connected with

a flexible membrane sheet;

a first element structured to activate

four unidirectional sensors, said four unidirectional sensors at least in part connected to said at least one sheet, said four unidirectional sensors useful to control the game;

a second element with structure to activate

a first two rotary potentiometers, said first two rotary potentiometers at least in part connected to said at least one sheet, said first two rotary potentiometers useful to control the game;

a third element with structure to activate

a second two rotary potentiometers, said second two rotary potentiometers at least in part connected to said at least

one sheet, said second two rotary potentiometers useful to control the game;

an independent first button structured to activate

a first button sensor, said first button depressible by a single finger of a user, said first button sensor at least in part connected to said at least one sheet, said first button sensor creates simple switched On/Off data useful to control the game;

an independent pivotal second button structured to activate

a second button sensor, said second button pivots upon depression by a single finger of the user, said second button sensor at least in part connected to said at least one sheet, said second button sensor capable of outputting a proportional signal useful to control the game;

an independent pivotal third button structured to activate

a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor at least in part connected to said at least one sheet, said third button sensor capable of outputting a proportional signal useful to control the game;

tactile feedback means for providing vibration detectable by the user of the game, said tactile feedback means connected to said circuitry.

42. A 3-D graphics controller according to claim 41 wherein said tactile feedback means comprises a motor and offset weight,

43. A 3-D graphics controller for controlling a television based game, comprising:

circuitry located at least in part on

at least one sheet, said at least one sheet comprising:

a circuit board sheet; said circuit board sheet connected with

a flexible membrane sheet;

a first element structured to activate

four unidirectional sensors, said four unidirectional sensors at least in part connected to said at least one sheet, said four unidirectional sensors useful to control the game;

a second element with structure to activate

a first two rotary potentiometers, said first two rotary potentiometers at least in part connected to said at least one sheet, said first two rotary potentiometers useful to control the game;

a third element with structure to activate

a second two rotary potentiometers, said second two rotary potentiometers at least in part connected to said at least one sheet, said second two rotary potentiometers useful to control the game;

an independent first button structured to activate

a first button sensor, said first button depressible by a single finger of a user, said first button sensor at least in part connected to said at least one sheet, said first button sensor creates simple switched On/Off data useful to control the game;

an independent pivotal second button structured to activate

a second button sensor, said second button pivots upon depression by a single finger of the user, said second button sensor at least in part connected to said at least one sheet, said second button sensor capable of outputting a proportional signal useful to control the game;

an independent pivotal third button structured to activate

a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor at least in part connected to said at least one sheet, said third button sensor capable of outputting a proportional signal useful to control the game.

44. A 3-D graphics controller for controlling a television based game, comprising:

circuitry located at least in part on

at least one sheet, said at least one sheet comprising:

- a circuit board sheet connected to
- a flexible membrane sheet;
- a first element structured to activate
 - four unidirectional sensors, said four unidirectional sensors at least in part connected to said at least one sheet, said four unidirectional sensors useful to control the game;
- a second element with structure to activate
 - a first two rotary potentiometers, said first two rotary potentiometers at least in part connected to said at least one sheet, said first two rotary potentiometers useful to control the game;
- a third element with structure to activate
 - a second two rotary potentiometers, said second two rotary potentiometers at least in part connected to said at least one sheet, said second two rotary potentiometers useful to control the game;
- an independent first button structured to activate
 - a pressure-sensitive first button sensor useful to control the game, said first button depressible by a single finger of a user, said first button sensor at least in part connected to said at least one sheet, said first button sensor capable of outputting a proportional signal representing amount of pressure applied to said first button;
- an independent second button structured to activate
 - a pressure-sensitive second button sensor useful to control the game, said second button depressible by a single finger of the user, said second button sensor at least in part connected to said at least one sheet, said second button sensor capable of outputting a proportional signal representing amount of pressure applied to said second button;
- tactile feedback vibration in the controller detectable by the user of the game.

45. A 3-D graphics controller according to claim 44 wherein said tactile feedback vibration is supplied by a motor and offset weight.

46. A 3-D graphics controller according to claim 44 wherein said controller further includes an independent third button structured to activate

a third button sensor, said third button depressible by a single finger of the user, said third button sensor at least in part connected to said at least one sheet, said third button sensor creates simple switched On/Off data useful to control the game.

47. A 3-D graphics controller for controlling a television based game, comprising:

circuitry located at least in part on

at least one sheet, said at least one sheet comprising:

a circuit board sheet connected to

a flexible membrane sheet;

a first element structured to activate

four unidirectional sensors, said four unidirectional sensors at least in part connected to said at least one sheet, said four unidirectional sensors useful to control the game;

a first rotary potentiometer at least in part connected to said at least one sheet, said first rotary potentiometer useful to control the game;

a second rotary potentiometer at least in part connected to said at least one sheet, said second rotary potentiometer useful to control the game;

a third rotary potentiometer at least in part connected to said at least one sheet, said third rotary potentiometer useful to control the game;

a fourth rotary potentiometer at least in part connected to said at least one sheet, said fourth rotary potentiometer useful to control the game;

an independent first button structured to activate
a pressure-sensitive first button sensor useful to control the game, said first button depressible by a single finger of a user, said first button sensor at least in part connected to said at least one sheet, said first button sensor capable of outputting a proportional signal representing amount of pressure applied to said first button;

an independent second button structured to activate
a pressure-sensitive second button sensor useful to control the game, said second button depressible by a single finger of the user, said second button sensor at least in part connected to said at least one sheet, said second button sensor capable of outputting a proportional signal representing amount of pressure applied to said second button;

tactile feedback vibration in the controller detectable by the user of the game.

48. A 3-D graphics controller according to claim 47 wherein said controller further includes an independent third button structured to activate

a third button sensor, said third button depressible by a single finger of the user, said third button sensor at least in part connected to said at least one sheet, said third button sensor creates simple switched On/Off data useful to control the game.

49. A 3-D graphics controller according to claim 47 wherein said tactile feedback vibration is provided by a motor and offset weight.

50. A 3-D graphics controller used with a television based game, comprising:

a first element structured to activate
four unidirectional sensors, said four unidirectional sensors useful to control said game; said four unidirectional

sensors at least in part connected to
circuitry;

a second element with structure to activate

a first two rotary potentiometers, said first two
rotary potentiometers at least in part connected to said
circuitry, said first two rotary potentiometers useful to control
said game;

a third element with structure to activate

a second two rotary potentiometers, said second two
rotary potentiometers at least in part connected to said
circuitry, said second two rotary potentiometers useful to
control said game;

an independent first button structured to activate

a first button sensor, said first button depressible by
a single finger of a user, said first button sensor at least in
part connected to said circuitry, said first button sensor
creates simple switched On/Off data useful to control said game;

an independent pivotal second button structured to activate

a second button sensor, said second button pivots upon
depression by a single finger of the user, said second button
sensor at least in part connected to said circuitry, said second
button sensor capable of outputting a proportional signal useful
to control said game;

an independent pivotal third button structured to activate

a third button sensor, said third button pivotal upon
depression by a single finger of the user, said third button
sensor at least in part connected to said circuitry, said third
button sensor capable of outputting a proportional signal useful
to control said game;

active tactile feedback vibration detectable by the user of
said game, said active tactile feedback vibration provided by

an offset weight connected to

a motor, said motor at least in part connected to said
circuitry.

51. A 3-D graphics controller used with a television based game, comprising:

- a first element structured to activate
 - four unidirectional sensors, said four unidirectional sensors used to control said game;
- a second element with structure to activate
 - a first two rotary potentiometers, said first two rotary potentiometers used to control said game;
- a third element with structure to activate
 - a second two rotary potentiometers, said second two rotary potentiometers used to control said game;
- an independent first button structured to activate
 - a first button sensor, said first button depressible by a single finger of a user, said first button sensor creates simple switched On/Off data used to control said game;
- an independent pivotal second button structured to activate
 - a second button sensor, said second button pivots upon depression by a single finger of the user, said second button sensor capable of outputting a proportional signal used to control said game;
- an independent pivotal third button structured to activate
 - a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor capable of outputting a proportional signal used to control said game;
- an offset weight is connected to
 - a motor to provide active tactile feedback used to provide vibration to the user of said game.

52. A 3-D graphics controller used with a television based game, comprising:

- a first element movable on two axes, said first element structured to activate
 - four unidirectional sensors, said four unidirectional sensors used to input a first axis and a second axis of control

for the game;

a first bi-directional proportional sensor, said first bi-directional proportional sensor used to input a third axis of control for the game;

a second bi-directional proportional sensor, said second bi-directional proportional sensor used to input a fourth axis of control for the game;

a third bi-directional proportional sensor, said third bi-directional proportional sensor used to input a fifth axis of control for the game;

a fourth bi-directional proportional sensor, said fourth bi-directional proportional sensor used to input a sixth axis of control for the game;

an independent first button structured to activate

a first button sensor, said first button depressible by a single finger of the user, said first button sensor capable of outputting a proportional signal used to control the game;

an independent second button structured to activate

a second button sensor, said second button depressible by a single finger of the user, said second button sensor capable of outputting a proportional signal used to control the game;

a sheet connecting to at least eight of the sensors.

53. A 3-D graphics controller used with a television based game, comprising:

a housing;

a first element structured to activate four unidirectional sensors used to control a television based game, said first element supported at least in part by said housing and sufficiently exposed to allow two axes of input;

a second element structured to activate a first two bi-directional proportional sensors used to control the game, said second element supported at least in part by said housing;

a third element structured to activate a second two bi-directional proportional sensors used to control the game, said

third element supported at least in part by said housing;

an independent first button sensor, said first button sensor depressible by a single finger of a user, said first button sensor creates simple switched On/Off data used to control the game, said independent first button sensor at least in part connected to

a sheet;

an independent pivotal second button structured to activate

a second button sensor, said second button pivots upon depression by a single finger of the user, said second button sensor at least in part connected to said sheet, said second button sensor capable of outputting a proportional signal used to control the game;

an independent pivotal third button structured to activate

a third button sensor, said third button pivotal upon depression by a single finger of the user, said third button sensor at least in part connected to said sheet, said third button sensor capable of outputting a proportional signal used to control the game;

active tactile feedback vibration detectable by the user of the game, said active tactile feedback vibration provided by

an offset weight connected to

a motor, said motor supported within said housing.

54. A 3-D graphics controller for controlling a television based game, comprising:

a first element structured to activate four unidirectional sensors, said four unidirectional sensors useful to control the television based game; said four unidirectional sensors at least in part connected to

a first sheet;

a second element structured to activate a first two bi-directional proportional sensors, said first two bi-directional proportional sensors at least in part connected to said first sheet, said first two bi-directional sensors useful to control

the television based game;

a third element structured to activate a second two bi-directional proportional sensors, said second two bi-directional proportional sensors useful to control the television based game; said second two bi-directional proportional sensors at least in part connected to

a second sheet, said first sheet located on a first plane, and said second sheet located on a second plane;

an independent first button sensor, said first button sensor depressible by a single finger of the user, said first button sensor at least in part connected to said first sheet, said first button sensor capable of transforming depression into a proportional signal useful to control the television based game;

an independent second button sensor, said second button sensor depressible by a single finger of the user, said second button sensor at least in part connected to said first sheet, said second button sensor capable of transforming depression into a proportional signal useful to control the television based game;

tactile feedback means for providing vibration detectable by the user of said electronic game, said tactile feedback means supported within said controller.

55. A 3-D graphics controller for controlling a game, comprising:

a first element structured to activate four unidirectional sensors, said four unidirectional sensors useful to control a game; said four unidirectional sensors at least in part connected to

a first sheet;

a second element structured to activate a first two bi-directional proportional sensors, said first two bi-directional proportional sensors at least in part connected to said first sheet, said first two bi-directional sensors useful to control the game;

a third element structured to activate a second two bi-directional proportional sensors, said second two bi-directional sensors useful to control the game; said second two bi-directional proportional sensors at least in part connected to a second sheet, said first sheet located on a first plane, and said second sheet located on a second plane within said controller;

an independent first button, said first button depressible by a single finger of the user, said first button positioned to activate a first proportional sensor and said first button positioned to activate a simple switched On/Off sensor useful to control the game; said first proportional sensor connected to said first sheet, said first proportional sensor capable of transforming depression of said first button into a proportional signal useful to control said electronic game;

an independent second button, said second button depressible by a single finger of the user, said second button positioned to activate a second proportional sensor and said second button positioned to activate a simple switched On/Off sensor useful to control said electronic game; said second proportional sensor connected to said first sheet, said second proportional sensor capable of transforming depression of said second button into a proportional signal useful to control said electronic game;

tactile feedback means for providing vibration detectable by the user of said electronic game, said tactile feedback means supported within said controller.

56. A 3-D graphics controller according to claim 55 wherein the first and the second proportional sensors are each unidirectional sensors.

57. (once amended) A controller comprising structure allowing manual inputs to rotate a platform on two mutually perpendicular axes, the rotation translated into electrical signals by four unidirectional sensors associated with the

platform, the signals at least in part controlling objects and navigating a viewpoint, the controller including a vibrator providing vibration detectable by a human user inputting to the controller; the unidirectional sensors including spacing preventing false activation by the vibration.

58. A controller according to claim 57 wherein said controller further has a plurality of independent depressible buttons, said buttons structured to activate button sensors, said button sensors output electrical signals proportionate to depression of said buttons.

59. A controller according to claim 58 wherein said button sensors also output On/Off data.

60. A controller according to claim 59 wherein additional independently depressible buttons output only On/Off data.

61. A controller according to claim 58 wherein said controller further includes a second element movable on two perpendicular axes, said second element structured and positioned to activate two bi-directional proportional sensors.

62. A controller according to claim 58 wherein said two bi-directional proportional sensors are rotary potentiometers.

63. (once amended) A hand operated controller comprising structure allowing hand inputs rotating a platform on two mutually perpendicular axes to be translated into electrical outputs by four unidirectional sensors to allow controlling objects and navigating a viewpoint, said unidirectional sensors including spacing generally preventing false activation through vibration, the controller including a tactile feedback means for providing vibration detectable by the user through the hand operating the controller;

a second element movable on two mutually perpendicular axes, said second element structured to activate two bi-directional proportional sensors providing outputs at least in part controlling objects and navigating a viewpoint;

a third element movable on two mutually perpendicular axes, said third element structured to activate two bi-directional proportional sensors providing outputs at least in part controlling objects and navigating a viewpoint;

a plurality of independent finger depressible buttons, each button associated with

a button sensor, said button sensor outputs at least On/Off data to allow controlling of the objects.

64. A hand operated controller according to claim 63 wherein the sensors are connected by at least one sheet.

65. A hand operated controller according to claim 64 wherein said at least one sheet comprises a flexible membrane sheet connected to a substantially rigid circuit board sheet.

66. A hand operated controller according to claim 65 wherein said button sensor outputs data proportionate to depression of one of said buttons.

67. A hand operated controller according to claim 66 wherein the bi-directional proportional sensors are rotary potentiometers.

68. A hand operated controller according to claim 66 wherein the bi-directional proportional sensors are optical encoders.

69. A hand operated controller according to claim 66 wherein said tactile feedback means comprises a motor and offset weight.

70. (once amended) A hand operated controller comprising structure allowing hand inputs rotating a platform on two mutually perpendicular axes to be translated into electrical outputs, the controller structured with four unidirectional sensors to allow controlling objects and navigating a viewpoint, said unidirectional sensors including spacing generally preventing false activation through vibration, the controller including an electro-mechanical tactile feedback means for providing vibration detectable by the user through the hand operating the controller;

a second element movable on two mutually perpendicular axes, said second element structured to activate two bi-directional proportional sensors;

a third element movable on two mutually perpendicular axes, said third element structured to activate two bi-directional proportional sensors;

a plurality of independent finger depressible buttons, each button associated with

a button sensor, said button sensor outputs at least On/Off data;

the sensors are connected by at least one sheet, said at least one sheet comprises

a flexible membrane sheet connected to
a circuit board sheet.

71. A hand operated controller according to claim 70 wherein said button sensor outputs data proportionate to depression of one of said buttons.

72. A hand operated controller according to claim 71 wherein at least two of said buttons pivot upon depression to activate their respective proportional sensors.

73. A hand operated controller according to claim 72 wherein the bi-directional proportional sensors are rotary potentiometers.

74. A hand operated controller according to claim 72 wherein the bi-directional proportional sensors are optical encoders.

75. A hand operated controller according to claim 71 wherein said tactile feedback means comprises a motor and offset weight.

76. A 3-D graphics controller having an economical combination of elements and buttons allowing a user to control a television based game, the controller comprising:

- a housing;

- a first element structured to activate four unidirectional sensors used to control a television based game, said first element supported at least in part by said housing and sufficiently exposed to allow two axes of input;

- a second element structured to activate a first two rotary potentiometers used to control the game;

- a third element structured to activate a second two rotary potentiometers used to control the game;

- a circuit board supporting circuitry, said circuit board located in said housing, the rotary potentiometers mounted to said circuit board;

- an independent first button structured to activate

- a first button sensor, said first button depressible by a single finger of the user, said first button sensor at least in part supported by said housing, said first button sensor capable of outputting a proportional signal used to control the game;

- an independent second button structured to activate

- a second button sensor, said second button depressible by a single finger of the user, said second button sensor at

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least in part supported by said housing, said second button sensor capable of outputting a proportional signal used to control the game;

active tactile feedback structure located in said housing.

77. A 3-D graphics controller according to claim 76 wherein said active tactile feedback structure includes an offset weight connected to a motor.